

Ethnic-specific suggestions for physical activity based on existing recreational physical activity preferences of New Zealand women

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Physical activity is well known for its positive health effects, including disease prevention, weight management and improved metabolic health.¹⁻³ Conversely, physical inactivity is associated with increased risk of many non-communicable diseases, including cardiovascular disease and type 2 diabetes,⁴ and is ranked 4th as a risk factor for mortality in Australasia.⁵ Hence, physical activity guidelines have been established in many countries⁶⁻¹¹ aimed at reducing the risk of non-communicable diseases, improving overall health and maintaining a healthy body weight.^{6,7,10,12} New Zealand minimum physical activity guidelines recommend the accumulation of ≥ 150 min of at least moderate intensity aerobic exercise, such as brisk walking and swimming, spread throughout each week.⁶ In addition, muscle strengthening exercise (e.g. weights) at least twice weekly is recommended.⁶ Even greater health benefits may be gained from longer or more intense activity, for instance replacing walking with running. Recommended physical activity may occur in a variety of settings, from formal and structured sport (e.g. organised club netball competition), to casual exercise alone or with friends (e.g. walking on the beach). However, physical activity guidelines are based on duration and intensity, rather than on specific activities, so it is often unclear which prescribed activities are equivalent to other

Abstract

Objectives: Recreational physical activities of New Zealand women were examined to develop ethnic-specific suggestions encouraging physical activity (PA) participation as a targeted approach to reduce obesity rates among different groups.

Methods: Healthy Māori, Pacific and European women (n=331; 16-45 years of age) completed an online Recent Physical Activity Questionnaire to assess recreational PA and adherence to PA guidelines. Existing PA preferences were tailored to make ethnic-specific suggestions aimed at increasing PA participation.

Results: Achievement of PA guidelines was: Māori 74%; Pacific 60%; European 70%. Highest participation across all women was for walking (Māori 72%, Pacific 60%, European 83%), followed by floor exercise (Māori 54%, Pacific 37%, European 56%). Gym-type activities (e.g. weights, aerobics) and jogging were also common across ethnic groups. Group/team activities (dance, netball, touch football) were among the top 10 activities for Māori and Pacific, but not European women.

Conclusion: Obesity rates among specific ethnic groups of New Zealand women might be reduced by promoting activities that are: family/whānau-oriented (netball, touch), community-linked (hula, dance) and outdoor-based.

Implications for public health: Tailoring existing PA preferences to develop ethnic-specific sets of activity suggestions could be important avenues to increase PA participation, improving the PA habits and subsequent health of New Zealand women and their communities.

Key words: RPAQ, physical activity, PA guidelines, cultural, ethnicity

more preferred activities.¹³ For instance, if walking is a prescribed or suggested activity, is touch football an appropriate substitute, equivalent in exercise intensity? Encouraging such flexibility in the pursuit of personally or culturally interesting and relevant activities might increase participation in all forms of physical activity,^{10,13,14} thereby alleviating some of the health burden caused by physical inactivity.¹⁰

Currently, only 48% of New Zealand adults are sufficiently active to meet the national guidelines;¹⁵ women are less active (45%) and more inactive (18%) than men (51% and 13%, respectively).¹⁵ Time constraints and financial burden are common barriers to physical activity participation among New Zealand adults¹⁶; however, childcare responsibilities and social support pose particular barriers for women.^{16,17} Parenthood, and in particular

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motherhood, is associated with reduced recreational physical activity in many countries,^{17,18} and likely also in New Zealand. Therefore, providing strategies to overcome some of these barriers might encourage greater physical activity participation among some women, especially if focused on particular groups of women, such as young mothers and those who are overweight.

Social-cultural factors in some ethnic groups may prevent participation in physical activity.¹⁰ Some cultural values inhibit female participation in exercise, while religious beliefs might disallow Sunday sport participation.^{14,19,20} Conversely, physical activity can provide freedom, independence and community-building.²¹ For example, one of the imperatives for exercise participation among Māori is whānau (family),²² while local iwi or kaupapa-led initiatives (e.g. Māori-specific netball clubs) encourage community engagement in both social and competitive activities. In a similar way, Pacific peoples have strong connections to the church and community.¹³ While many popular activities (e.g. kilikiti – a form of cricket) are intended for community-building purposes, entire villages participate in all aspects of the activity, be it as a player, a supporter or in preparing food.²³ Cultural initiatives such as these have potential to promote increased physical activity participation by providing support, familiarity and inclusivity to all participants, regardless of age and gender.^{13,14,24}

Some segments of the population are over-represented in certain health statistics that are mediated by physical activity.²⁵ Considerable ethnic disparities exist in obesity prevalence in New Zealand, with higher rates among Pacific women (69.5%) compared to Māori (47.6%) and European/Other (30.6%) women.²⁶ Additionally, Pacific women have over three times the risk (RR 3.48, 95%CI 2.49–4.85) of developing type 2 diabetes compared to non-Pacific women, while the risk of ischemic heart disease is two times higher among Māori (RR 2.20, 95%CI 0.30–16.17) than for non-Māori women.²⁵ Any level of physical activity reportedly substantially attenuates the risk of these chronic diseases.^{27,28} For example, risk of coronary heart disease was 14% lower among women meeting basic physical activity guidelines compared to those who did not.²⁸ Promoting the benefits of physical activity involvement to population groups with higher metabolic disease risk is important in overcoming the negative health consequences of physical inactivity.

However, the prescriptive nature and cultural differences in interpretation of physical activity guidelines may seem daunting and difficult for some groups to engage with.^{10,13} Hence, the purpose of this study was to examine the recreational physical activity habits of New Zealand women of different ethnicities to identify each group's unique physical activity preferences. The resulting data were then used to determine how existing physical activity preferences might be tailored for each ethnic group to better align with physical activity recommendations, and to improve participation.

Methods

This cross-sectional study reports subjectively measured physical activity data obtained as part of the Women's EXPLORE (Examining Predictors Linking Obesity Related Elements) study,²⁹ conducted in Auckland, New Zealand. The full methodology of the EXPLORE study is described elsewhere.²⁹ Participants were recruited via university email lists, previous research participant lists, marae, churches, magazines and community newspapers, social media, local businesses and events. The study was approved by the Massey University Human Ethics Committee and conducted in accordance with the Declaration of Helsinki. Prior to data collection, written informed consent was obtained from participants.

Participants

Participants (n=331) were healthy pre-menopausal women aged 16–45 years of Māori (indigenous people of New Zealand; n=57), Pacific (n=65) or European (n=209) descent. Ethnicity was self-determined; participants were asked the ethnicity/ethnicities of their parents and with which of these ethnicities they most strongly identified. Participants were excluded if they were pregnant, lactating or diagnosed with any metabolic condition or chronic illness.

Data collection

Participants completed the validated Recent Physical Activity Questionnaire (RPAQ)^{30,31} adapted for online entry (SurveyMonkey; Palo Alto, CA). Levels of physical activity were assessed in four domains (home, work, recreational, transport) over the previous four weeks. However, as recreational physical activity was the focus of this study only the recreational data are reported. The RPAQ contains a list of 35 groups of recreational

activities, as well as four 'Other' activities (for other or New Zealand specific activities) against which frequency and duration of participation were recorded.

Participants completed a Demographic Questionnaire, including details of parenting (whether or not they had children) and employment. Participants' height (cm) and weight (kg) were measured in order to calculate body mass index (BMI; kg/m²).

Data processing

Data were manually cleaned and then processed in accordance with questionnaire guidelines.³² Any activities listed under 'Other' were considered individually and added to listed activities most similar in type, intensity and metabolic equivalent (MET).^{33,34} Moderate intensity activities were 3.0–6.0 METs; vigorous intensity activities were >6.0 METs. When comparing activities against physical activity guidelines,⁶ only those with a substantial aerobic component were included. For instance, activities such as running, cycling and netball were included, whereas activities of lower aerobic intensity, such as playing music, floor exercises and watering the garden, were not. Data were processed using SPSS Statistics 22 for Windows (SPSS, Inc., Chicago, IL) according to questionnaire guidelines.³²

All continuous variables were tested for normality using Kolmogorov-Smirnov test together with analysing histograms, normal Q-Q plots and boxplots. Non-normal data were log transformed and re-tested for normality. Parametric data are presented as mean ± standard deviation (SD), and non-parametric data as median (25th, 75th percentile). Categorical data are reported as count and percentage (%). For comparison of continuous variables between two groups, independent samples t-tests and Mann-Whitney U tests were performed for parametric and non-parametric data, respectively. For comparison of categorical variables between groups, one-way ANOVA and Kruskal-Wallis tests were performed for parametric and non-parametric data, respectively. Significance was set at $p < 0.05$ for all variables.

Results

RPAQ data were obtained from 331 participants (57 Māori, 65 Pacific, 209 European; Table 1) across a wide BMI range (18.7–49.2 kg/m²). Women spent 7.17 (4.29,

9.16) h/day in sedentary behaviour. A total of 261 women were employed (part or full time; 34.0 (20.0, 40.0 h/week)), 63.6% of whom held sedentary jobs.

Participants spent 54.6 (30.0, 90.6) min/day engaged in recreational activities, accounting for 20.8% of total activity energy expenditure (Table 1). Employed women spent statistically more time in recreational activities than women who were not employed ($U=7,589$, $p=0.030$). Overall, recreation time did not differ significantly between those with and without children ($p=0.087$); however, Pacific women with children spent statistically less time in recreational activities than Pacific women without children ($U=317$, $p=0.026$). Physical activity guidelines were met by 68.8% of participants. Fewer Pacific women (60.0%) than Māori (73.7%) or European (70.3%) women ($F(2,328)=4.593$, $p=0.011$; Table 1) met the guidelines.

Walking was the most popular activity across the total population by duration (79.8±138.6 min/week), frequency (1.5±1.7 times/week), participation (76.7%) and energy expenditure (0.67±1.15 MET-h/day), and also when stratified by ethnicity (Figure 1). All gym-type activities (weights, aerobics, floor exercise, conditioning exercise) were among the top 10 activities across all ethnicities, based on time, frequency, participation and energy expenditure (Figure 1). Jogging accounted for the greatest energy expenditure for Māori (0.92±2.10 MET-h/day) and European (0.80±1.77 MET-h/day) women. For Pacific, the highest energy expenditure came from walking (0.68±2.13 MET-h/day), followed by music performance (0.33±0.78 MET-h/day).

Discussion

In this study, the recreational physical activity habits of Māori, Pacific and European women living in New Zealand were examined, with the aim of identifying ethnic-specific activity preferences on which to base future physical activity recommendations. Many activities (e.g. walking, weights) were common across all three ethnicities, while others had specific community and cultural connections. For example, dance (including traditional dance such as kapa haka) was popular among Māori women (39% participation), while performing music (35% participation) was popular among Pacific women.

Walking stood out as clearly the most popular activity by participation, time, frequency

Table 1: Participant characteristics and allocation of time.

	Total	Māori	Pacific	European	<i>p</i>
n (%)	331 (100)	57 (17.2)	65 (19.6)	209 (63.1)	
Age (mean±SD years)	31.5 ± 8.3	31.1 ± 8.3	29.0 ± 8.9	32.4 ± 8.0	0.013
BMI (kg/m ²)					
18.5–24.9	162 (48.9)	24 (42.1)	9 (13.9)	129 (61.7)	<0.001
25.0–29.9	86 (26.0)	15 (26.3)	16 (24.6)	55 (26.3)	0.944
≥30.0	83 (25.1)	18 (31.6)	40 (61.5)	25 (12.0)	<0.001
Employed	261 (78.9)	47 (82.5)	37 (56.9)	177 (84.7)	0.006
Participants with children	124 (37.5)	32 (56.1)	22 (33.9)	70 (33.5)	<0.001
Time allocation (median h/day, % of 24 h)					
Work (employed only) ^a	4.86 (20.3)	5.43 (22.6)	4.29 (17.9)	4.86 (20.3)	0.615
Total sedentary (non-work) ^b	7.17 (30.0)	7.92 (33.3)	7.44 (31.0)	6.94 (28.9)	0.251
Screen time (non-work) ^c	4.00 (16.7)	4.87 (20.3)	4.84 (20.2)	3.65 (15.2)	0.001
Recreational time (min/day)					
Total recreation ^d	54.6 (30, 90.6)	56.4 (41.4, 94.8)	45.0 (21.0, 81.6)	58.8 (32.4, 89.4)	0.087
Moderate intensity ^e	40.2 (21.0, 64.8)	48.0 (24.0, 67.8)	30.0 (9.0, 50.4)	41.4 (22.2, 67.8)	0.022
Vigorous intensity ^e	5.4 (0.0, 21.6)	6.6 (0.0, 29.4)	0.0 (0.0, 9.6)	6.6 (0.0, 21.6)	<0.001
Energy expenditure (MET-h/day)	4.3 (2.2, 7.1)	4.9 (2.8, 7.9)	3.4 (1.5, 5.4)	4.4 (2.4, 7.1)	0.058
% participants meeting PA guidelines ^f	68.8	73.7	60.0	70.3	0.011

Notes:

Values are n (% of n) or median (25th, 75th percentile)

Abbreviations: BMI, body mass index; MET, metabolic equivalent of task; PA, physical activity

a: Work refers only to participants employed full or part time

b: Total sedentary time, not including unallocated time

c: Screen time is also included in Total sedentary

d: Total recreation time, including light, moderate and vigorous activities

e: Activity intensities are: moderate, 3.0–6.0 METs; vigorous, >6.0 METs

f: % of participants who recorded ≥150 min/wk of at least moderate intensity (≥3.0 METs) aerobic activity.

Bold typeface indicates significant differences between groups at $p < 0.05$.

and energy expenditure, across all ethnic groups (77% participation). Walking is also consistently the most popular recreational activity among women nationally (72%) and in many other countries, including Australia (25%) and the United Kingdom (67%).^{35–37} Indeed, among Pacific women, walking accounted for almost twice the participation and nearly 40% more time than any other recreational activity. In contrast, European women spent equal time walking and doing weights (11.8 min/day); almost double the next most time consuming activities (conditioning exercise and jogging). The high incidence of walking reported among this cohort of women contributed to rates of meeting physical activity guidelines (70%) substantially higher than is reported nationally for women (45%).¹⁵ Contrary to national figures, the prevalence of meeting guidelines varied by ethnicity and was higher among Māori (74%) and European (70%) women than for Pacific women (60%).

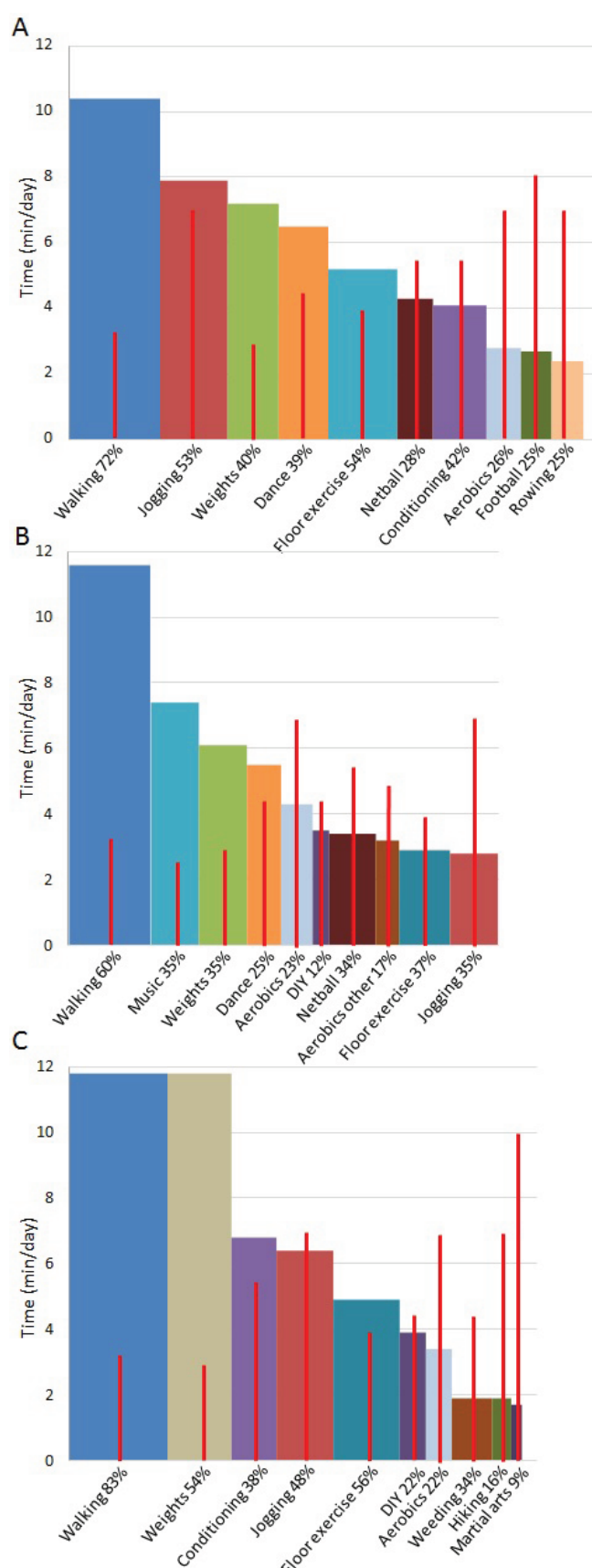
Jogging and gym-type activities (i.e. aerobics, floor exercise, weights, conditioning) were popular across all ethnic groups, and also rank highly nationally,³⁶ in Australia³⁷ and in the United Kingdom.³⁵ Although time and participation in gym-type activities

was common across all ethnic groups, the context in which these activities occurred is unknown and might vary between different groups. While these activities may take place in traditional settings such as gyms, they may equally have occurred in church-based,³⁸ whānau-focused (e.g. Koha Fit)²² or boot-camp settings, which are becoming increasingly popular among many groups of women. Importantly, the environment in which exercise occurs can be as meaningful as the exercise itself, especially in the context of encouraging participation among certain populations.³⁹ Adapting existing familiar activities into more acceptable and meaningful settings may encourage physical activity participation and engagement, and ultimately improve health outcomes.

Māori

Māori view health holistically as overall wellbeing or *hauora*, and regard the balance between physical, spiritual, psychological and family/social dimensions as important elements of wellbeing.⁴⁰ For many Māori, sport participation is often about more than the sport itself; it provides a mechanism to fulfil a greater need for support, belonging and the provision of unified goals (e.g.

Figure 1: Top 10 activities (by time) per ethnic group.



Notes: Time (min/day) spent performing each of the 10 most time consuming activities for each ethnic group. (A) Māori, (B) Pacific, (C) European. Height of bars indicates time (min/day) spent performing each activity. Width of bars indicates percentage of women participating in activity. Red bars indicate relative intensity of activity (METs). Numbers associated with activity labels also indicate percentage of women participating in activity.

through teamwork).²¹ Team and group activities were popular among Māori women, reflecting cultural values of whānau and whanaungatanga (connectedness). Indeed, cultural (43.1%) and social (69.7%) values are important motivators for exercise participation among Māori adults.⁴¹ Team sports, such as touch football and netball, and various cultural activities (e.g. kapa haka) rated among the top 10 activities in the current study, and are also favoured nationally among Māori.⁴² Gym-type activities were also popular among Māori women, and some participation may have occurred in boot-camps or whānau-focused fitness sessions,^{22,43} reflecting the desire for group connectedness and social support. Encouraging participation in the types of activities already popular among Māori women, but doing so in an appealing group environment (e.g. whānau-focused sessions) might fulfil many of these important cultural needs and provide a simple avenue to engage more women, and possibly their whānau, into physical activity.

Resistance exercise, such as conditioning and weights exercises (~40% participation), combined with high incidence of walking, ensured that many Māori women fulfilled all aspects of the physical activity guidelines, rather than simply the aerobic component, as is commonly reported in New Zealand.⁶ Resistance exercise is known to reduce type 2 diabetes risk by improving factors (e.g. mitochondrial function) important in the development of this disease.^{27,44,45} Hence, resistance exercise might be particularly beneficial to Māori women who are at increased risk of type 2 diabetes (RR 1.84 vs. non-Māori women).²⁵ Other chronic diseases prevalent among Māori women (e.g. cardiovascular disease)²⁵ are also mediated by aerobic exercise,^{28,46} making regular participation in a range of physical activities particularly important for this group.

Glossary of Māori terms

Māori word	Meaning
Kapa haka	Traditional dance
Hauora	Māori philosophy of health, overall wellbeing
Iwi	Tribe
Kaupapa	Purpose
Waka ama	Outrigger canoeing
Whānau	Family
Whanaungatanga	Connectedness

Based on current physical activity habits, more Māori women could achieve physical activity guidelines simply by participating in already familiar and popular activities but being encouraged to do so in acceptable, friendly and supportive environments (Table 2). For example, playing netball twice a week in a local community-based competition (60 min), attending a 45 min whānau-fit session at a local park, and walking or playing touch with whānau for 45 min would easily fulfil the 150 min/week of physical activity as set out in physical activity guidelines.⁶ Substituting activities, such as replacing netball with waka ama (outrigger canoe) training would provide even greater health benefits by increasing muscular strength while still offering strong aerobic elements in a social team environment. Furthermore, re-allocating existing walking time to a shorter duration of uphill walking, would increase intensity, and subsequent physiological and health benefits, while reducing total

time requirements. Encouraging more Māori women to participate in these ways would increase cardiovascular benefits, and provide a non-threatening and somewhat familiar pathway to increase physical activity, while maintaining important aspects of whanaungatanga and hauora.

Pacific

Music and dance were among the top four activities for Pacific women, and likely reflect a relative acceptance of culturally focused pursuits in preference to the perceived selfishness of fitness-oriented activities such as running.¹⁰ Culture and sport are interwoven with family, church and community in Pacific peoples' lives^{19,23} and are reflected in the group and team settings in which six of the top 10 activities were likely performed. Netball and volleyball were popular among Pacific women in the current study (34% participation) and nationally (approximately 14% in each sport);³⁶

Pacific-focused teams and competitions (e.g. Auckland Samoa Netball Association)⁴⁷ promote participation. Community-based pop-up fitness sessions conducted in local church halls and parks promote informal participation,⁴⁸ and hula exercise groups use traditional dance to maintain familiarity and connectedness while incorporating aerobic exercise elements.⁴³ Furthermore, church-based group sessions such as 'Faith-led Wellness' include physical activity as part of a healthy lifestyle programme.³⁸ All of these initiatives share the common thread of family, church and community for Pacific women.

At a national level, 26% of Pacific adults engage in recreational activities less than weekly,⁴¹ which was reflected in low recreational physical activity participation by many Pacific women in the current study. Indeed, 38% of Pacific women performed no single activity more than once each week, suggesting that for many women, any activity they did perform was not done so

Table 2: Suggested activities for inclusion in weekly physical activity.

Ethnic group	Existing activities				Increasing health benefits of activity		
	Activity	Setting	Duration	METs	Strategy	Outcomes	METs
Māori	Netball	Local competition	½ game (30 min)	5.5	Enter team in Pa Wars tournament	More focused, higher intensity training. Commitment to training. Social.	>5.5
	Boot-camp	Park before work with sister or daughter	45 min	~6.0	Choose more challenging exercise options, reduce rest time between activities	Various exercise intensities to build CV fitness and strength	~7.0
	Kapa haka	With whānau	60 min	4.2			
	Touch football	Local park with whānau	45 min	6.4	Enter team in regular competition	Increased intensity and cardiovascular fitness and benefits. Commitment to team	>6.4
	Walk	Local park with friends and whānau	45 min	3.4	Take along rugby or soccer ball to pass/chase with children while walking	Higher intensity. Fun. Teaching children skills.	~6.0
	Waka ama	With whānau	40 min	~7	Mixed crew with older children	Increased CV fitness and strength	
Pacific	Touch football	Park with family or community members	20 min	6.4	Setup weekly competition with other families	More fun and social. Increased intensity and CV benefits	>6.4
	Netball	Local courts with church team	½ game (30 min)	5.5	Enter inter-church tournament	Goal to work toward. Increased intensity and CV benefits	
	Hula session	Church hall	45 min	4.5	Increase intensity of session	Increase CV fitness, co-ordination	>4.5
	Pacific Fiva fitness session	School hall with friends	45 min	~6.0	Sessions provide multiple intensity options – use weights where possible, run instead of walk, shorter rest periods	Fun, local, building strength and lean mass and CV fitness	~7.0
	Walk	In park with family after church	30 min	3.5	Walk on hilly terrain or carrying young child to increase resistance	Increased strength and lean mass, and CV fitness/benefits	~5.5
	Gym session	Weights, crosstrainer	60	~4.0	Reduce weights time, increase aerobic (e.g. rowing), kickboxing class	Retain large amount of resistance exercise while increasing aerobic component	~6.0
European	Walk	Around local area with friend	30	3.5	Family walk at beach (soft sand), take along Frisbee to throw around with children, piggy-back small children	Increase intensity (difficult terrain sand), fun, variety, setting example for children	≥5.5
	Swimming	Playing in wave with children	20	6.0	Swim out to buoy or standup paddle board while others remain with children	Increase CV fitness and muscular conditioning.	~6.5
	Jogging	From home with neighbour	30	7.0	Enter fun run with neighbours, workmates, other mums. Alternate walk/run for longer distances	Commitment to event, more focused training, goal to work toward, increased CV fitness.	7.0
	Boot-camp	Local park with friend	45	~6.0	Choose more challenging exercise options – jump v normal squats, run v walk between activities, increase speed/ reps	Variety of exercise intensities to build CV fitness and strength	~7.0

Note:

Activities are suggestions that could be included in weekly physical activity and would contribute to meeting physical activity guidelines. Strategies are included to alter some activities to further increase their health benefits.

Abbreviations: METs, metabolic equivalents of task; CV, cardiovascular.

habitually. Participation in three of the top six activities was for less than three minutes each day and by only 34–37% of women. As well, the second most time-consuming activity, music performance, is of only light intensity (2.5 METs), meaning that a large proportion of recreation time was of low-energy expenditure. Adding light dance or other movement to music performance would substantially increase energy expenditure, likely without altering the existing setting.

Participation in weights exercises by 35% of Pacific women is particularly encouraging. Pacific women are at especially high risk of type 2 diabetes,²⁵ and resistance exercise is known to protect against this disease.^{27,44,45} Regular physical activity of any type is a key factor in protecting against chronic diseases and improving general health and weight management.^{24,27,28} Furthermore, physical activity of any amount is widely promoted as being better than no activity at all.^{6,10} Hence, steps must be taken to further engage many Pacific women in sports and group activities that provide a familiar, social and supportive pathway to increased physical activity. Group fitness sessions are an ideal setting to effectively combine aerobic and resistance exercise to gain the physiological and consequent health benefits of both activity types.

Healthy lifestyles are often not a priority for Pacific peoples in the absence of apparent disease symptoms⁴⁹ and may be influenced by cultural values and lifestyles.³⁹ Successful implementation of physical activity initiatives rely on consideration of cultural and family ties, customs and social acceptance.¹⁴ Pacific adults are more likely than non-Pacific to put others ahead of their own physical activity participation;⁵⁰ and the vital role of women in the family is often prioritised ahead of women's own health and wellbeing.^{16,51} Pacific mothers in the current study were less active than Pacific women without children, supporting evidence for social support and child-care as incentives for physical activity participation among Pacific mothers.¹⁶ Community and family group activities would likely enable other adults and older children to mind younger children and play traditional or skill-based games, allowing mothers time to exercise. Mothers' behaviour might also normalise exercise among children, guiding them into a physically active lifestyle. Since commitment to group activities, by default, requires some degree of commitment to physical activity, engaging in physical

activity in group settings would increase the likelihood of habituating participation in these activities.

Aligned to the guidelines, physical activity among Pacific women could be increased by playing half a game of netball twice a week (or one game and one training, 60 min) with friends and family. A 20-minute casual game of touch football at a local park with family or community members would provide relatively high-intensity exercise in a non-threatening, fun and accessible environment. At the same time, non-playing members might offer encouragement or engage in their own physical activity such as walking or playing with children. A 45-minute hula session in the church hall and a short 30-minute family walk after church, would provide a further 75 minutes of physical activity. Added together, these easily achievable sessions (in terms of physical demands, commitment and logistics; Table 2) would fulfil physical activity guidelines by providing familiar, fun exercise in a supportive and acceptable environment, while also fulfilling family and cultural needs.

European

The response of European women to messages promoting regular physical activity seems largely prescriptive, through convenient activities such as walking/jogging and gym-type exercise. European women spent equal time (11.8 min/day) walking and doing weights and they also recorded high participation in other gym-type activities. For 17% of European women the only activities performed more than once each week were gym-type activities, while 37% of European women engaged in at least three of the four gym-type activities weekly. High physical activity participation by European women was a particularly positive and encouraging finding, however, these women could have more effectively used the time they dedicated to physical activity. Weights (3.0 METs) and walking (3.5 METs) were the equal top activities by time commitment, yet these activities are the least intense of the top 10 for this group. Consequently, the greatest time was spent performing activities of the lowest energy cost. European women are also at elevated risk of cardiovascular disease,²⁵ so encouraging good-quality aerobic exercise among this group would be particularly beneficial in reducing disease risk.¹²

Most New Zealand adults engage in exercise primarily for fitness, health and enjoyment

(~87%),³⁶ but some other motivations may also be important.³⁶ Convenience is regarded more highly for exercise participation by European adults (45.6%) than by Māori (38.6%) or Pacific (28.3%),³⁶ whereas cultural factors are more important to Māori (39.2%) and Pacific (35.3%) compared to European (28.2%) adults.³⁶ These ethnic differences might reflect the lack of any clearly defined European culture, especially in terms of specific activities that might be regarded as 'cultural' or 'traditional'. But the European culture might be more subtle and may be represented by a love of the outdoors.⁵² Indeed, the bush and water (lakes, rivers, beach/sea) are used more by European adults for their recreational activities (e.g. hiking or kayaking) than by Māori or Pacific adults.³⁶ Since convenience ranks highly among European women,³⁶ simply modifying some existing physical activities to make them more time-efficient, effective and interesting, might encourage participation. While many women enjoy typical gym environments due to their consistency, familiarity and for motivation,⁵³ others, especially those who are unaccustomed to exercise or have low body image, may be intimidated by such environments.^{53–55} This apprehension could be largely alleviated by moving existing activities into supportive, fun settings (e.g. boot-camps, female-specific gym classes); at the same time providing an incentive to commit to a specific time for exercise rather than relying on the greater self-motivation required to perform casual workouts.⁵³ Therefore, if non-exercisers were encouraged into regular participation in environments appealing to the individual (e.g. small, friendly gyms, the outdoors), then exercise might become more focused on pleasure and enjoyment,⁵³ rather than purely for the sake of exercise in unengaging environments. Combining the time spent in walking and weights, many European women met all components of the physical activity guidelines. Even within current habits, merely substituting time spent in some activities into different activities already being performed could greatly increase health benefits (Table 2). Two one-hour gym sessions per week might be broken up into 30 minutes of conditioning exercise (e.g. rowing, cross trainer), 20 minutes of weights and 10 minutes of floor exercises, or performing one gym session as described and one boot-camp workout. Almost half of women already jog, although only infrequently (less than

once per week). Replacing some walking with jogging, or walk/jog while building fitness, would increase the physiological demand and cardiovascular benefits, while potentially reducing time investment. Walking around busy urban streets might be replaced with beach or bush walks, or intensified on challenging terrain (e.g. soft sand or hills) or with a load such as pushing a buggy or piggy-backing a small child. Furthermore, substituting in some of these outdoor activities already mentioned might help to make the entire exercise experience more enjoyable and less burdensome. Some summer gym sessions could be replaced with beach activities oriented around family or friends. For instance, adults might take turns kayaking (3.5 METs) or stand-up paddle boarding (6 METs) while others swam or played cricket (5 METs) on the beach, delivering similar physiological benefits but in a pleasant and natural environment. By making any of these simple changes, with little or no additional time commitment, European women could greatly increase the health benefits gained from regular physical activity, while potentially increasing enjoyment and reducing the perceived burden of exercise.

The current study has a number of potential limitations that must be acknowledged. Being questionnaire-based, these findings are susceptible to over-reporting, known to be more prevalent among less active and non-European New Zealanders.⁵⁶ The RPAQ does not record most non-sedentary at-home activities (e.g. child care), but this was unlikely to influence findings since recreational activity was the focus of this study. Furthermore, the context and environment in which activities took place is not known, and may be relevant when making suggestions based on current habits. The lack of socioeconomic data collected is also a potential limitation, as socioeconomic status is known to impact physical activity participation and health outcomes.¹⁵ This study does also have a number of important strengths that warrant mention. Use of the RPAQ provided valuable insight into the duration, frequency and mode of recreational physical activities in which New Zealand women engage. Combined with the reporting of New Zealand's three main ethnic groups, these findings are valuable in informing suggestions based on familiar and popular activities specific to each ethnic group. Similar strategies

could be employed to meet the needs of, and promote exercise participation among, other ethnic and religious groups living in New Zealand and elsewhere. For instance, catering to Islamic religious beliefs regarding female participation in sport and exercise could encourage participation.²⁰ Indeed, such initiatives have been implemented with women-only sessions at community swimming pools, receiving overwhelming support, not only by Muslim women, but a range of women who would not otherwise have engaged in such activity in an open environment.⁵⁷

Conclusions

In this study, the physical activity preferences of women from three different New Zealand ethnic groups were examined. A common element across all ethnic groups was the high participation in walking, which contributed to almost 70% of all women meeting physical activity guidelines. Ethnic-specific differences in other activities influenced suggestions aimed at increasing physical activity participation among these women. Māori women could be encouraged to build on existing team/group activities to increase their physical activity participation, and that of their whānau, while maintaining a sense of belonging and connectedness. Similarly, centring physical activity around family, church and community might be the most effective means to increase participation among Pacific women. In contrast, European women might benefit from diversifying their existing preferred activities, or taking some activities into the outdoors, thus improving health outcomes and likely also the experience of exercising. Providing specific sets of suggestions based on established physical activity habits may encourage women of all ethnicities and their families to increase physical activity participation and contribute to a reversal in New Zealand's alarming obesity-related health outcomes. Understanding social differences between people of different ethnicities, and how these relate to exercise participation, will enable better understanding of the specific exercise regimes and contexts that may be appropriate and acceptable to women from different ethnicities. Future research on this topic is warranted to determine the efficacy and acceptability of the exercise suggestions presented in this study and to develop and test exercise suggestions tailored for other specific ethnic and religious groups.

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Ethnic-specific suggestions for physical activity based on existing recreational physical activity preferences of New Zealand women

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